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# SUPPLEMENT TO REPORT ON MUNICIPAL AND INDUSTRIAL WATER REQUIREMENTS, SAN GABRIEL RIVER, LOWER BRAZOS RIVER SYSTEM, TEXAS

Public Health Service
Dallas, Texas

December 1960

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SUPPLEMENT

TO REPORT ON

MUNICIPAL AND INDUSTRIAL WATER REQUIREMENTS

SAN GABRIEL RIVER

LOWER BRAZOS RIVER SYSTEM

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Public Health Service, Region VII
Dallas, Texas

In Cooperation with the

DEPARTMENT OF THE ARMY

U. S. Army Engineer District - Fort Worth, Texas

DECEMBER 1960

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# I. INTRODUCTION

## Purpose and Scope

The purpose of this supplement is to update and revise certain information presented in the original report.

These corrective measures became necessary when:

1. The non-federal interest rate used for discounting and determining annual costs was changed from 3 to 4 per cent.

2. A structure at the Laneport site was added to the plan which had originally called for just two reservoirs on the San Gabriel River.

3. A revised estimate was made of the amount of ground water that municipal and industrial interests might totally develop in the area by the year 2010.

4. The size and cost of the proposed Somerville project on Yegua Creek were changed.

The information provided herein is intended to revise only those sections or topics of the original report which are related to the four items mentioned above.

## II. ADDITIONS AND REVISIONS

### Addition of Laneport Reservoir

Laneport Reservoir, as presently planned, will be located at mile 29.1 of the San Gabriel River and will be able to furnish a safe yield from its conservation storage of approximately 23 mgd (million gallons per day). This 23 mgd, when added to the combined safe yield of approximately 30 mgd from the two upstream projects considered in the original plan, brings the total yield from the proposed projects in the San Gabriel watershed to approximately 53 mgd. This additional yield also increased the total yield of all the surface water impoundments considered as sources of supply to the lower Brazos River Basin to approximately 539 mgd.

### Revision of Estimate of Ground-Water Availability

A revision of the estimate of the ground water that might be developed for municipal and industrial purposes became appropriate when new data were made available from work now in progress for the U. S. Study Commission - Texas. The original estimate was that on the order of 50 mgd of ground water might be developed by 2010, for the uses of municipal and industrial interests. It has become apparent in the re-evaluation of the ground-water problem that 50 mgd are presently developed for municipal and industrial purposes. It is estimated that in the future on the order of an additional 65 or 70 mgd might be developed in the lower Brazos River area for these uses. The future development of approximately 67 mgd would bring the total to 117 mgd of ground water that might be developed to help satisfy the requirements of municipal and industrial water users.

### Revised Tabulation of Potential Sources

Table 4 of the original report (see page 15 of the original report) has been revised to include the additional 67 mgd that might be made available from ground water and the additional 23 mgd that Laneport Reservoir could provide to water users in the lower Brazos River Basin.

It can be concluded from comparing the expected total water requirements of 1,102 mgd by 2010, with the total estimated yield of 656 mgd, that a demand exists for maximum feasible amount of municipal and industrial water supply storage that can be economically developed in the proposed projects on the San Gabriel River.

Table 4
(Revised)

Existing and Proposed Water Sources
Lower Brazos River Area

| | Estimated Yield (MGD) |
|---|---|
| Lake Waco (existing enlarged) | 55 |
| Lake Belton (existing enlarged) | 105 |
| Stillhouse Hollow (proposed) | 63 |
| San Gabriel Projects (proposed) | 53 |
| Millican Reservoir (proposed) | 226 |
| Somerville Reservoir (proposed) | 37 |
| Ground Water (existing development) | 50 |
| Ground Water (future development) | 67 |
| | 656 |

## Revision of Benefits of Storage

With reference to the original report, the word "Project" now means a system of six federal multipurpose reservoirs and the word "Alternative" refers to a hypothetical system of six single-purpose reservoirs which might, in the absence of the Project, be built for water supply only. The six single-purpose reservoirs are considered to be at the same sites as their Project counterparts. Also, they are assumed to have the same firm yields as their Project counterparts.

After study, it now appears that an interest rate of 4 per cent applied to the financing of a private, non-federal project is a more realistic rate than the 3 per cent used in the original report. For converting capital costs to equivalent annual costs, an economically useful life of 50 years and a non-federal interest rate of 4 per cent were assumed. Also the change from a rate of 3 per cent to a rate of 4 per cent is applicable to the discounting procedures used herein.

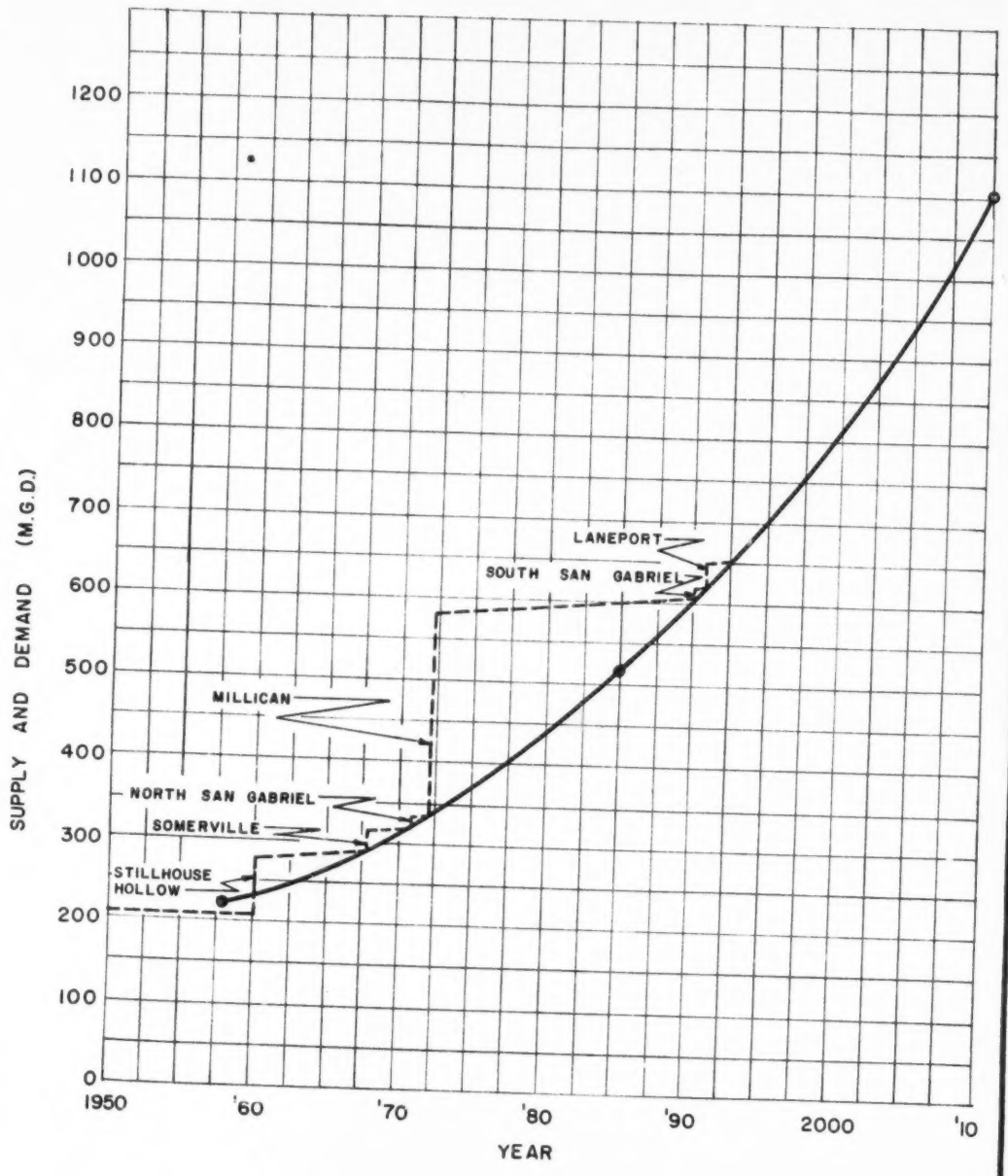
The single-purpose alternative (one of the six reservoirs comprising the Alternative) to the Laneport project has been added last in the hypothetical sequence of construction of the Alternative because it has the highest unit cost of the three alternatives considered in the San Gabriel watershed and because of its low use factor (ratio of actual use to capacity) over the longest period of time.

The 67 mgd from future ground-water development has been added in the hypothetical Alternative plan at a constant rate over a period of approximately 32 years. This accounts for the slope to the supply curve presented on the revised Figure 8. It is concluded that municipal and industrial interests will have completely developed this additional yield by the time that the yield from the last reservoir in the sequence is completely utilized.

Figure 8 has been revised to show also the changes in the quantities of the firm yields from the various sources. Superimposing these yields on a curve of future water requirements, in the previously mentioned sequence, gives the date of first utilization of each reservoir making up the Alternative (see Figure 8).

Table 8 has been revised to reflect the change in interest rate, the revised cost estimate and estimated yield from the proposed Somerville Reservoir project, the revised ground water estimate, and the addition of a structure at the Laneport site on the San Gabriel River. The benefits from each of the single-purpose reservoirs, which would begin being utilized at some date after the year 1965, have been discounted to the year 1965, using an interest rate of 4 per cent. Benefits attributable to each of the single-purpose reservoirs which would be utilized in or before the year 1965 have not been discounted. The discount periods used have been changed slightly from those in the original report, due to 67 mgd from ground-water sources being added to the sequence at a constant rate.

The combined 1965 value of storage in the Alternative plan is about 63 million dollars. For a combined yield of 379 mgd, this reduces to unit value of 2.12 cents per thousand gallons of yield. Individual benefits, which make up this average, are shown in the revised Table 8.




SAN GABRIEL RIVER
RESERVOIRS
FUTURE WATER REQUIREMENTS
and POTENTIAL SOURCES

U.S. DEPARTMENT OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION VII DALLAS, TEXAS

HJS

(REVISED) FIGURE 8

Table 8
(Revised)

Alternative Cost and 1965 Value

| | Stillhouse Hollow | Somerville | North San Gabriel | Millican | South San Gabriel | Laneport | Sum or Average |
|---|---|---|---|---|---|---|---|
| Order of Construction | (1) | (2) | (3) | (4) | (5) | (6) | |
| Yield, mgd | 63 | 37 | 19 | 226 | 11 | 23 | 379 |
| Construction Cost, Single-Purpose Alternative | $12,220,000 | $11,100,000 | $8,250,000 | $27,060,000 | $5,860,000 | $20,800,000 | |
| Annual Capital Cost (50 yrs @ 4%) | 570,000 | 517,000 | 384,000 | 1,260,000 | 273,000 | 970,000 | |
| Annual O & M Cost | 40,000 | 30,000 | 38,400 | 57,000 | 37,600 | 40,000 | |
| Combined Annual Cost | $ 610,000 | $ 547,000 | $ 422,400 | $ 1,317,000 | $ 310,600 | $ 1,010,000 | |
| Unit Cost ¢/1,000 gals. | 2.66 | 4.05 | 6.09 | 1.60 | 7.73 | 12.0 | |
| Year of First Need | 1960 | 1966 | 1970 | 1973 | 1990 | 1991 | |
| Discount Period | 0 | 1 | 5 | 8 | 25 | 26 | |
| Present Worth Factor | 1 | 0.962 | 0.822 | 0.731 | 0.375 | 0.361 | |
| 1965 Annual Value | $ 610,000 | $ 526,000 | $ 347,000 | $ 963,000 | $ 116,000 | $ 365,000 | $2,927,000 |
| 1965 Benefits in ¢/1,000 gals. yield | 2.66 | 3.89 | 5.00 | 1.17 | 2.89 | 4.35 | 2.12 |